

## **A Synthetic Indicator Method Applied to Putnam's Social Capital Indicators: The Case of Italy**

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# *A Synthetic Indicator Method Applied to Putnam's Social Capital Indicators: The Case of Italy*

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## **Abstract**

In his 1993 book titled *Making Democracy Work*, R. D. Putnam (1993) paved the way for many studies on the distribution of social capital in the different Italian regions. Moreover, he introduced the use of some 'specific' indicators to measure social capital considered as *civiness*, which have 'systematically' been adopted in subsequent investigations. In the present essay, the synthetic indicator method, which was designed by Pena (1977; 2009), was applied to the data collected by other scholars (specifically, Cartocci, 2007; Bordandini, Cartocci, 2014; Vanelli, Cartocci, 2015) who replicated Putnam's research (1993), in order to create a synthetic indicator of social capital. This 'methodological experiment' confirms that, in the northern part of Italy, *civiness* is more widespread than in the South. Furthermore, it proves that voluntary activities and blood donation actions have a major impact on social capital indicators.

Keywords: regional social capital, synthetic indicator, Putnam.

## **1. Introduction**

Social capital has been extensively studied in social science literature. A number of theoretical and empirical studies exist in which the concept has been analysed using different methodologies and defined in slightly different ways.

Introduced in scientific research for the first time in 1916 by L. J. Hanifan, an American supervisor of rural schools, the concept was then rediscovered more than fifty years later by the economist Loury (1977).

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However, the first systematic definitions were attributed to Bourdieu (1986), Coleman (1988, 1990) and Putnam (1993, 2000).

According to Bourdieu (1986), social capital can be identified as the resources pertaining to the network in which the individual is involved. Coleman (1988; 1990), who broadened the definition, considered social capital as the different entities of the social network, which facilitate the individual actions of the people involved in it. Putnam (1993), on the contrary, offered a macro definition and suggested that social capital was associated with the attributes possessed by the social organisation including, for example, norms, trust and network – ‘features’ which enhance individual action. In this sense, social capital indicates the ‘civic virtue’ of a society. All these definitions describe social capital as a social resource, which produces benefits for the individual (micro-level), the network (meso-level) and society (macro-level).

In addition, different indicators have been developed to determine the extent to which social capital is widespread. However, this approach has generated an active discussion concerning the validity of the parameters utilized as measures of social capital. Different methods were also adopted to analyse this concept, denoted as a multidimensional one in that it refers to the different dimensions of society and social networks.

Most recently, some research has been devoted to replicate the findings obtained by Putnam in *Making Democracy Work* (1993), which was one of the first studies about social capital focusing on Italian society. This line of research utilized updated indicators and not only analysed the change in the distribution of social capital, but also expanded the scope of the investigations by examining other social dimensions. Considering that these studies were carried out following the analyses of social capital by Putnam (1993), we might claim that a ‘research tradition’ with solid roots in Putnam’s work has been established.

Although the different methods applied by the various scholars and the ‘replications’ of Putnam’s research discuss the dissimilar variables used to measure social capital, none have adopted the distance method devised by Pena (1977). The aim of the present paper is therefore to describe a ‘methodological experiment’ in which the synthetic indicator approach is adopted. To our knowledge, this approach has never been used in the past to analyse social capital. We therefore applied it to the data collected in previous research carried out according to the perspective and measures of social capital indicated in Putnam (1993).

The present paper is structured as follows. First, we present a review of the studies concerning the spread of social capital across the Italian regions. These studies were conducted using the same indicator adopted by Putnam (1993). Second, a description of the synthetic indicator methods utilized is

provided and the data are discussed. The final section illustrates the synthetic social capital indicator outputs and the discriminatory power of each simple indicator. Finally, in the discussion section, the main results are summarised, the limitations of the research are highlighted and suggestions for future research studies made.

## 2. The social capital indicators and Putnam's 'research tradition'

The studies concerning the distribution of social capital in Italy underwent a rapid development following the publication of the research carried out by Robert Putnam and colleagues during the 1970s when, in Italy, the process of the institutionalisation of the regions – a 'new' form of sub-national government – was taking place. The results of those studies were published with the title *Making Democracy Work: Civic Tradition in Modern Italy*<sup>1</sup>.

This seminal work has inspired subsequent research on the distribution of social capital across the Italian regions. Such studies adopted different perspectives, taking into account political (Cartocci, 2007; Bordandini, Cartocci, 2014; Cartocci, Vanelli, 2015), economic (Nuzzo, 2006; Sabatini, 2008; 2009a; 2009b) and sociological issues (Carradore, 2009a; Righi, Turi 2007; Righi, 2013). Since then, sociological research has always been characterized by the analysis of social capital and the studies on this subject have multiplied (Carradore, 2009b; Di Nicola, Stanzani, Tronca 2011; Di Nicola, 2011; Di Nicola 2014; Donati, Tronca, 2008).

As far as the unit of analysis is concerned, although initially the focus was principally on regions, over the course of the years, the interest moved to other units, such as provinces – sub-regional units – (Cartocci 2007; Crescenzi, Gagliardi, Percoco, 2013; Scarlatto, 2001), work districts (Rizzi, 2003; Cainelli, Mancinelli, Mazzanti, 2007; Chiesi, 2007) and individuals (Di Nicola, 2006; Di Nicola, 2011; Di Nicola, Stanzani, Tronca, 2011; Donati, Tronca, 2008).

Concurrent with the differentiation of the unit of analysis a multiplication of the indicators used to measure social capital has also been observed. This has stimulated an animated discussion about the validity of the indicators, since some, such as crime rate, teenage pregnancy, blood donation, participation rates in tertiary education (Sabatini, 2008, Sabatini, 2009b) are considered as 'indirect' or 'outcome' indicators of social capital (Righi, Turi, 2007; Righi, 2013).

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<sup>1</sup> This book was translated into Italian and published by Mondadori (Milano) in 1993, with the title: *La tradizione civica nelle regioni italiane*.

However, the indicators used by Putnam to analyse the Italian context led to a path being carved out in the field of social capital research since other scholars started to adopt similar measures in their studies. Specifically, Putnam (1993) used four indicators, namely: 1) preference voting (1953-79); 2) referendum turnout (1974-87); 3) newspaper readership (1975); and 4) scarcity of sport and cultural associations (1981), to measure the civic engagement (*civicness*) of each Italian region, which Putnam considered, in a broad sense, a form of social capital. Putnam (1993) noticed that *civicness* was more widespread in the northern Italian regions than in the South of Italy. According to Putnam:

In the North, norms of reciprocity and networks of civic engagement have been embodied in tower societies, guilds, mutual aid societies, cooperatives, unions, and even soccer clubs and literary societies. These horizontal civic bonds have undergirded levels of economic and institutional performance generally much higher than in the South, where social and political relations have been vertically structured. Although we are accustomed to thinking of the state and the market as alternative mechanisms for solving social problems, this history suggests that both states and markets operate more efficiently in civic settings. (Putnam, 1993: 181).

More than ten years after this first study on social capital dealing with the Italian context, Cartocci (2007) used analogous indicators to those of Putnam (1993) to determine the distribution of social capital in 103 Italian provinces, at a level of analysis lower than the regional one<sup>2</sup>. Cartocci (2007) considered his research as an updating of Putnam's study (1993) and a more fine-grained analysis because he used 'smaller' units compared with those employed by Putnam. Moreover, he added blood donation as a new variable. This index was selected, because, according to the author, it represents a sense of obligation towards other people, a gift of time and money without receiving anything in exchange. Therefore, the indicators used by Cartocci (2007) were: 1) newspapers diffusion, calculated as a mean value for the years 2000 and 2001; 2) electoral participation, which considered the voter turnout at the national elections in 2001, the European elections in 1999, and referendums in 1999, 2000 and 2001; 3) voluntary sport association diffusion, as a combination of the members of the Italian National Olympic Committee (CONI) and its members in 1999 and members of voluntary sport organisations and their associates in 2001-2002; and 4) blood donations,

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<sup>2</sup> The provinces correspond to the NUTS 3 level according to the EU Nomenclature of territorial units for statistics (NUTS), which is the hierarchical system of classification of the economic territories of the EU.

which combined the number of blood donors and the number of blood donations in 2002. The social capital index at the provincial level was built by summing the standardized values of these single indicators.

The work carried out by Cartocci (2007) underlined, once again, that Northern Italy is endowed with more social capital than the South. Even though this analysis focused on the provincial level, the author also provided the variable values for the regional level allowing a comparison to be made with other studies conducted using the same unit of analysis.

TABLE 1. *Social capital indicators used in the Italian research context.*

Author/s	Indicator/s	Year/s	Variable/s	
Putnam (1993)	Political participation	1953-1979		
	Referendum turnout	1974-1987		
	Newspaper readership	1975		
	Sport and cultural associations	1981		
Cartocci (2007)	Political participation	1999-2001	National election, 2001 European election, 1999 Referendum, 1999 Referendum, 2000 Referendum, 2001	
	Newspaper diffusion	2000-2001	Newspaper diffusion, 2000 Newspaper diffusion, 2001	
	Volunteers in sport associations	1999; 2001-2002	Member of sport associations sport season, 2001-02 Number of sport associations sport season, 2001-02 Member of CONI, 1999 Number of sport organisation associated to CONI, 1999	
	Blood donations	2002		
	Bordandini and Cartocci (2014), Cartocci and Vanelli (2015)	Political participation	2008-2013	National election 2008 European election 2010 National election 2013
		Newspapers diffusion	2009-2010	Newspapers diffusion in 2009 Newspapers diffusion in 2010
Volunteers in social assistance no profit organisations		2011		
Blood donations		2008		

More recently, Bordandini and Cartocci (2014) reviewed Putnam's Italian map of *civiness* at the regional level. In addition to updating the indicators used

by Putnam (1993) and Cartocci (2007)<sup>3</sup>, these authors considered a new variable: general trust<sup>4</sup>. However, the social capital index was built using the mean value of the single indicators<sup>5</sup>, which were: 1) political participation; 2) newspapers diffusion; 3) volunteers for non-profit organisations that operate only within social assistance; and 4) rates of blood donations. The values of these four variables referred to the 2008-2013 period.

The results confirmed, once again, what was discovered in the previous studies; moreover the researchers noticed a high correlation between the social capital index and generalised trust.

Cartocci and Vanelli (2015), on the contrary, reconsidered the data used in Bordandini and Cartocci (2014) to describe the democratic quality of Italian institutions and the efficiency of the Italian market economy.

Table 1 reports the indicators used in Putnam's research (1993) and in the studies by his 'advocates'.

All the studies herein considered, conducted following the 'research tradition' established by Putnam, confirm the division between the northern and the southern Italian regions. Such a difference in the quantity of social capital, with northern Italy having more social capital than the South, is also confirmed by other studies carried out using different indicators and methods (see Nuzzo 2006; Righi, Turi 2007; Sabatini 2008a; 2009a; 2009b and Righi, 2013)<sup>6</sup>.

However, none of the studies mentioned here applied the synthetic indicator method introduced by Pena (1977; 2009) to analyse the distribution of social capital in Italy. In the present research, this 'new method' was used to synthesize the different simple indicators used in three previous studies conducted according to the Putman method (Cartocci, 2007; Bordandini, Cartocci 2014; Vanelli, Cartocci, 2015).

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<sup>3</sup> Bordandini and Cartocci (2014) defined these indicators as 'hard data'.

<sup>4</sup> The authors defined this index as 'self-reported data'.

<sup>5</sup> The values were then transformed into index-numbers by setting the national average at 100, which is also the national average of the final index.

<sup>6</sup> These studies were conducted using different numbers of indicators and diverse methods: Nuzzo (2006) used 12 variables proxy of social capital to calculate the average synthetic index of social capital and covered issues such as social and political participation, meeting friends and trust; Righi and Turri (2007) adopted 47 indicators, concerning volunteer activities, social participation, political information and trust; they were reduced by means of factor analysis into seven dimensions and compared using the benchmarking method. Sabatini (2008a; 2009a; 2009b), using the principal component technique, analysed more than 25 variables concerning strong family ties, weak informal ties, voluntary organizations and political participation. Righi (2013) used 13 indicators, ranging from trust, social and political participation and friendship relations; they were reduced in dimension using principal component analysis and then grouped using cluster analysis.



### 3. The synthetic indicator method

The technique employed in this research is based on the synthetic indicator designed by Pena (1977; 2009) and better known as the Pena distance method (DP<sub>2</sub>). Although initially this method was almost completely ignored by scholars because it had been published in Spanish, more recently it has attracted considerable interest in different research fields as demonstrated by the increasing number of papers published in specific scientific journals. Topics that have been analysed using the DP<sub>2</sub> method include: economic and social cohesion (Holgado Molina, Salinas Fernández, Rodríguez Martín, 2015); environmental quality (Montero, Larraz, Chasco, 2009; Montero, Chasco, Larraz, 2010); quality of life (Somarriba, Pena, 2009; Sommariba, Zarzosa, Pena, 2015), and welfare systems (Zarzosa, Sommariba, 2013; Martinez-Martinez, Lombe, Vazquez-Rodriguez, Coronado-Garcia, 2016).

As far as Italy is concerned, the first studies that applied the DP<sub>2</sub> method were carried out by Ivaldi, Bonatti and Soliani (2017) and Landi, Ivaldi and Testi (2017). The first used the DP<sub>2</sub> method to create a synthetic indicator to measure political participation at the regional level; the second used the Pena Distance method to calculate a deprivation index considering the census base of a city in the north-west of Italy as the unit of analysis.

The basis of the synthetic indicator is a mathematical function expressed as  $I = F(x_1, x_2, \dots, x_n)$ , where  $I$  is the synthetic indicator and  $n$  is the number of partial indicators (or variables),  $x$ , that contribute information to social capital.

The starting point for the calculation of the synthetic indicator is a matrix  $X$  (1) of order  $(j, i)$ , where  $j$  – the rows – is the number of cases – in this study the twenty Italian regions – and  $i$  – the columns – is the number of partial indicators – the variables used to measure social capital – considered. Each element  $x_{ij}$  of this matrix represents the state of the variable  $i$  in the region  $j$ .

$$\begin{bmatrix} x_{11} & \cdots & x_{1i} \\ \vdots & \ddots & \vdots \\ x_{j1} & \cdots & x_{ji} \end{bmatrix} \quad (1)$$

The DP<sub>2</sub> indicator, providing the distance of each region from a reference base (or fictitious region), which corresponds to the theoretical region achieving the lowest value of the variables being studied, is defined for region  $j$  as follows:

$$DP_{2j} = \sum_{i=1}^n \left\{ \left( \frac{d_{ij}}{\sigma_i} \right) (1 - R_{i,i-1,i-2,\dots,1}^2) \right\} \quad j = 1, 2, \dots, m \quad (2)$$

with  $i = 1, \dots, n$ ; where  $n$  is the number of partial indicators and  $j = 1, 2, \dots, m$

$d_{ij} = |x_{ij} - x_{ij}^*|$  is the difference between the value taken by the  $i$ -th partial indicator in the region  $j$  and the minimum of the variable in the least desirable theoretical scenario, namely the reference value of the matrix  $X$ .

$\sigma_i$  is the standard deviation of partial indicator  $i$ ;

$R_{i,i-1,i-2,\dots,1}^2$  is the coefficient of determination, or coefficient of multiple linear correlation squared in the linear regression of  $X_i$  over  $X_{i-1}, X_{i-2}, \dots, X_1$ , and it indicates the part of the variance of  $X_i$  explained linearly by the variables  $X_{i-1}, X_{i-2}, \dots, X_1$ . This coefficient is an abstract number and it is unrelated to the measurement units of the different partial indicators<sup>7</sup>.

$(1 - R_{i,i-1,\dots,1}^2)$  is the correction factor, which shows the variance part of  $X_i$  not explained by the linear regression model. This factor ensures that the composite synthetic indicator includes only the new information from each partial indicator, avoiding the duplication of information already contained in the preceding variables.

Thus defined, the  $DP_2$  is the sum of the distances between the values of variable  $i$  in the territory  $j$  and the minimum values for the variables in all territories, weighted by the unexplained variance of  $X_i$  and the variance  $X_i$ . A greater distance from the worst theoretical condition shows a higher  $DP_2$  value, indicating more social capital, whereas, a lower distance from the worst theoretical condition describes a scarce level of  $DP_2$ .<sup>8</sup>

The  $DP_2$  synthetic indicator method was applied because it provides the following advantages: it allows inter-spatial and inter-temporal comparisons of the analysed cases; it permits the aggregation of variables expressed in different units of measurement; it allows arbitrary weighting; and it prevents information duplication. Moreover, this method is considered more robust than traditional methods such as Principal Component Analysis and Data Envelopment Analysis, as demonstrated by Somarriba and Pena (2009) in a research comparing this method with others.

<sup>7</sup> If all partial indicators are uncorrelated  $R^2=0$ .

<sup>8</sup> For data analysis the package R was used (Pérez-Luque, Moreno, Pérez-Pérez, Bonet, 2012).

TABLE 2. *The properties of the DP<sub>2</sub> synthetic indicator.*

Properties of DP <sub>2</sub>	Description
Existence and determination	Given the mathematical function defined by DP <sub>2</sub> , it exists and takes a certain value provided that the variance of each and every one of the partial indicators is finite and greater than zero.
Monotony	The DP <sub>2</sub> react positively to a positive variation in any of the partial indicators and negatively to a negative transformation.
Uniqueness quantification	For a given situation the synthetic indicator must provide a single value or verify the invariance to changes of origin and/or scale. Therefore, when a change is made in the scale of measurement of one or more components the result of DP <sub>2</sub> is not altered.
Invariance	The DP <sub>2</sub> is invariant to changes at origin and/or scale in the measurement of the components.
Homogeneity	The DP <sub>2</sub> is a grade 1 homogeneous function with respect to the simple indicators.
Transitivity	Admitting that there are three values of the synthetic indicator, if the first is greater than the second, and the second, in turn, is greater than the third, it must be verified that the first is greater than the third. This propriety is verified since DP <sub>2</sub> is a numerical value.
Completeness	The DP <sub>2</sub> index maximizes the useful information provided by each of the simple indicators incorporated into the overall index.
Neutrality	The weight of each single variable would be given by the useful information contained in each one. In general, it is demonstrated that the ordering of the variables in the DP <sub>2</sub> corresponds to their relative importance, measured in terms of linear correlation with the final synthetic indicator.

Source: adapted from *Rodríguez Martín (2012)*.

Furthermore, as underlined by Somarriba and Pena (2009), Zarzosa and Sommariba (2013) and Rodríguez Martín (2012), among others, the DP<sub>2</sub> distance synthetic indicator also has the mathematical properties shown in table 2. To determine which partial indicator included in the synthetic indicator of social capital has the highest discrimination power in terms of region disparities in Italy, the Ivanovic Discrimination Coefficient (DC) was also calculated (Ivanovic, 1974; Zarzosa, 1996). Its computation comes from the following equation:

$$DC_i = \frac{2}{m(m-1)} \sum_{j,l>j}^{k_i} m_{ji} m_{li} \left| \frac{x_{ji} - x_{li}}{\bar{X}_i} \right| \quad (3)$$

where m is the number of the regions, m<sub>ji</sub> is the absolute frequency of x<sub>ji</sub>, which is the value of the indicator x<sub>i</sub> in the region j,  $\bar{X}_i$  is the mean value of x<sub>i</sub>, and k<sub>i</sub> is the number of different values taken by x<sub>i</sub>.

This indicator, which displays the amount of information provided by each single variable, ranges between 0 and 2 (Zarzosa, 1996), the two extremes

of theoretical cases. If DC is zero, this means that a variable has the same value in all the units of analysis and that its discrimination power is null. If DC is equal to two, a variable has a value other than zero for one region (the remainder  $m - 1$  equal to zero), and in this case, the partial indicator will exert full discrimination power.

However, following Zarzosa (1996), the impact exerted by the partial indicator on the synthetic indicator depends jointly on the following three ‘factors’: 1) the linear correlation coefficient between the DP<sub>2</sub> score and each single constituent indicator; 2) the correction factors and 3) the discrimination power of each indicator. The coefficient, which includes all these three ‘factors’, is the Relative Individual Information Coefficient (RIIC), which ranges from 0 to 1; the sum of the RCII values is equal to 1. The RCII – expressed by  $\alpha$  – comes from the equation (4):

$$\alpha_i = \frac{DC_i(1 - R_{i,i-1,\dots,1}^2)}{\sum_{i=1}^n DC_i(1 - R_{i,i-1,\dots,1}^2)} \quad (4)$$

The RIIC value thus provides a complete amount of relative information that each simple indicator contributes individually to the synthetic indicator of social capital. More specifically, as underlined in the literature, this measure ‘merges useful information and the discriminant power of each simple indicator, and measures the amount of relative (merged) information each simple indicator individually contributes, when orderly forming part of the synthetic indicator DP<sub>2</sub>.’ (Zarzosa, Sommariba, 2013: 14).

### 3.1 The data

The data used in the present analysis come from Cartocci (2007), Bordandini and Cartocci (2014) and Cartocci and Vanelli (2015)<sup>9</sup>. The analysis units are constituted by the twenty Italian regions.

The data also respect the following criteria: 1) consistency with previous research, such as Putnam (1993); 2) availability of the indicators in Italy; 3) representativeness of the data sources across the 20 Italian regions, and 4) mutual exclusiveness of indicators. Moreover, they permit a temporal comparison with respect to the similar dimensions.

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<sup>9</sup> Unfortunately it was not possible to obtain the regional values of the indicators used by Putnam (1993).

Table 3 reports the simple indicators used to create the three synthetic indicators of social capital. They are divided according to each specific analysis; the year of reference is also indicated. These simple indicators, according to the scholars that used them in previous research, represent the active and visible participation to the *polis*, i.e., the political participation, whereas newspaper diffusion ‘describes’ the invisible socio-political participation. Social participation and blood donation represent the relationship with non-relatives and the oblation offered to unknown people.

TABLE 3. *Simple indicators used to calculate the synthetic indicator of social capital.*

Author/s	Simple indicator and year/s	Dimension
Cartocci (2007)	Mean value of the electoral participation in the: 2001 national election; 1999 European election; 1999 referendum; 2000 referendum; and 2001 referendum	Political participation
	Mean value of newspaper diffusion in 2000 and 2001 per 1000 residents	Newspaper diffusion
	Number of members of sport associations referred to sport seasons 2001-02 per 1000 residents	Volunteering
	Number of sport associations referred to sport seasons 2001-2002 per 1000 residents	
	Number of members of CONI in 1999 per 1000 residents	
	Number of sport organisations associated to CONI in 1999 per 1000 residents	
	Number of blood donations in 2002 per 1000 residents	Blood donations
Bordandini and Cartocci (2014)	Mean value of electoral participation in the: 2008 national election; 2010 European election; and 2013 national election expressed as a %	Political participation
	Mean value of newspaper diffusion in 2009 and 2010 per 1000 residents	Newspaper diffusion
	Number of volunteers for non profit organisations in the social assistance sector in 2011 per 1000 residents	Volunteering
	Blood donations in 2008 per 1000 residents	Blood donations
Cartocci and Vanelli (2015)	% of electoral participation in the 2008 national election	Political participation
	% of electoral participation in the 2010 European election	
	% of electoral participation in the 2013 national election	
	Mean value of the newspaper diffusion in 2009 and 2010 per 1000 residents	Newspaper diffusion
	Number of volunteers for non profit organisations in the social assistance sector in 2011 per 1000 residents	Volunteering
	Blood donations in 2008 per 1000 residents	Blood donations

Bordandini and Cartocci (2014) and Cartocci and Vanelli (2015) used the same data; however, in the present analysis, in order to conform to the data published in the original papers for the calculation of the synthetic indicator with the data from Cartocci and Vanelli (2015) the single variables representing the political participation were used. By contrast, for the calculation of the synthetic indicator using the data from Bordandini and Cartocci (2014), the mean value of the political participation was considered. Thus, the most relevant difference that needs to be dealt with is between Cartocci (2007) and Bordandini and Cartocci (2014). Between these two studies, there is a difference of six-years and the simple indicators used in them refer to the time of the financial crisis.

The synthetic social capital indicators were computed using few simple indicators; however, although some examples of the synthetic indicator calculated using just few variables can be found in the literature (see for instance Canaviri, 2016; Somarriba, Zarzosa, 2016, Landi, Ivaldi, Testi, 2017), other examples exist where a considerable number of simple indicators are used (see for instance Zarzosa, Sommariba, 2013; Somarriba, Zarzosa, Pena, 2015).

#### **4. The results**

The mean, variability and the max-min difference for each synthetic indicator of social capital are reported in table 4. The data suggest a reduction in the difference between synthetic indicators.

*TABLE 4. Descriptive statistics of the three synthetic indicators of social capital*

Synthetic Indicator	N.	Mean	Standard deviation	Min	Max	Diff. max-min
DP <sub>2</sub> Cartocci (2007)	20	5.36	2.79	0.42	9.87	9.45
DP <sub>2</sub> Bordandini and Cartocci (2014)	20	4.22	2.07	0.55	7.70	7.15
DP <sub>2</sub> Cartocci and Vanelli (2015)	20	5.36	2.26	1.31	8.75	7.44

The synthetic indicator values of social capital are indicated in table 5; in the last three columns, the Pena distance coefficients are reported according to the region and the research of reference. In accordance with the explanation of the synthetic indicator given in the methodology section, the lower the value of the synthetic indicator, the lower the level of social capital (and vice versa).

Considering the synthetic indicator calculated using the simple indicators given in Cartocci (2007), the regions with the highest levels of social capital are Emilia-Romagna, the Aosta Valley, Tuscany and Friuli-Venetia Giulia. The

first two are more than nine units away from the undesirable fictitious region (null value in the synthetic indicator).

The two regions with the lowest levels, as far as social capital is concerned, are – starting from the worst – Campania and Calabria, which are less than two units far from the null value. All the other Italian regions are collocated between them.

Focusing on the synthetic social capital indicator computed using the simple indicators adopted by Bordandini and Cartocci (2014), a change is noticeable in the regions with the highest levels of social capital. In this case, the regions which are more distant from the undesirable fictitious case are Trentino-Alto Adige/Südtirol, followed by Emilia-Romagna and Friuli-Venetia Giulia. All these regions are more than 6.3 units from the null value in the synthetic indicator. Campania and Calabria are again at the opposite end of the classification. Sicily also performs badly for social capital, being less than two units from the ‘null condition’ as was Calabria.

TABLE 5. *The three synthetic indicators of social capital*

Regions	DP <sub>2</sub> Cartocci (2007)	DP <sub>2</sub> Bordandini and Cartocci (2014)	DP <sub>2</sub> Cartocci and Vanelli (2015)
Abruzzi	3.74	2.95	4.67
Aosta Valley	9.52	3.94	5.40
Apulia	2.51	2.04	3.35
Basilicata	2.53	2.45	3.39
Calabria	1.09	1.37	1.31
Campania	0.42	0.55	1.93
Emilia-R.	9.87	7.34	8.75
Friuli-V. G.	8.11	6.36	7.02
Lazio	3.60	3.53	5.17
Liguria	6.73	5.39	5.97
Lombardy	6.09	6.14	7.43
Marche	6.11	4.99	6.89
Molise	2.81	2.85	5.08
Piedmont	6.95	5.39	6.59
Sardinia	6.45	3.87	3.16
Sicily	2.23	1.37	1.48
Trentino-A. A.	6.72	7.70	8.00
Tuscany	8.63	5.98	7.22
Umbria	6.77	4.29	6.63
Veneto	6.43	6.00	7.75

The fourth column of table 5 provides the values of the synthetic social capital indicator computed using the simple indicators used by Cartocci and Vanelli (2015). This is a variant of the previous synthetic indicator, because in this computation, instead of their average, the single variables that compose the political participation dimension were considered. The other three simple indicators have remained the same. The synthetic indicator shows that, also in

this case, Emilia-Romagna and Trentino-Alto Adige/Südtirol are the two regions with the best performance for social capital, compared with the other cases, whereas Calabria, Sicily and Campania are deficient in this form of social resource, in contrast with other regions.

All these results confirm the social capital gap between the North and the South of Italy, as already described in the literature. However, considering that the DP<sub>2</sub> coefficient is a cardinal measure and that the ranges for the three distributions are different, it is more advantageous to consider the normalised values<sup>10</sup> – reported in table 6 – which, as underline by Corbetta (2003), allow a comparison of the three different DP<sub>2</sub> synthetic indicators of social capital (see also Somarriba, Zarzosa, 2015).

In table 6, where the regions are listed according to the normalised values of the synthetic indicators, the rank position of each region for every single synthetic indicator becomes clear.

*TABLE 6. Ranking of Italian regions following the normalized DP<sub>2</sub> value for the three different studies considered*

Cartocci (2007)		Bordandini and Cartocci (2014)		Cartocci and Vanelli (2015)	
Regions	DP <sub>2</sub>	Regions	DP <sub>2</sub>	Regions	DP <sub>2</sub>
Emilia-Romagna	1.00	Trentino-Alto Adige	1.00	Emilia-Romagna	1.00
Aosta Valley	0.96	Emilia-Romagna	0.95	Trentino-Alto Adige	0.90
Tuscany	0.87	Friuli-Venetia Giulia	0.81	Veneto	0.87
Friuli-Venetia Giulia	0.81	Lombardy	0.78	Lombardy	0.82
Piedmont	0.69	Veneto	0.76	Tuscany	0.79
Umbria	0.67	Tuscany	0.76	Friuli-Venetia Giulia	0.77
Liguria	0.67	Piedmont	0.68	Marche	0.75
Trentino-Alto Adige	0.67	Liguria	0.68	Umbria	0.71
Sardinia	0.64	Marche	0.62	Piedmont	0.71
Veneto	0.64	Umbria	0.52	Liguria	0.63
Marche	0.60	Aosta Valley	0.47	Aosta Valley	0.55
Lombardy	0.60	Sardinia	0.46	Lazio	0.52
Abruzzi	0.35	Lazio	0.42	Molise	0.51
Lazio	0.34	Abruzzi	0.34	Abruzzi	0.45
Molise	0.25	Molise	0.32	Basilicata	0.28
Basilicata	0.22	Basilicata	0.26	Apulia	0.27
Apulia	0.22	Apulia	0.21	Sardinia	0.25
Sicily	0.19	Sicily	0.11	Campania	0.08
Calabria	0.07	Calabria	0.11	Sicily	0.02
Campania	0.00	Campania	0.00	Calabria	0.00

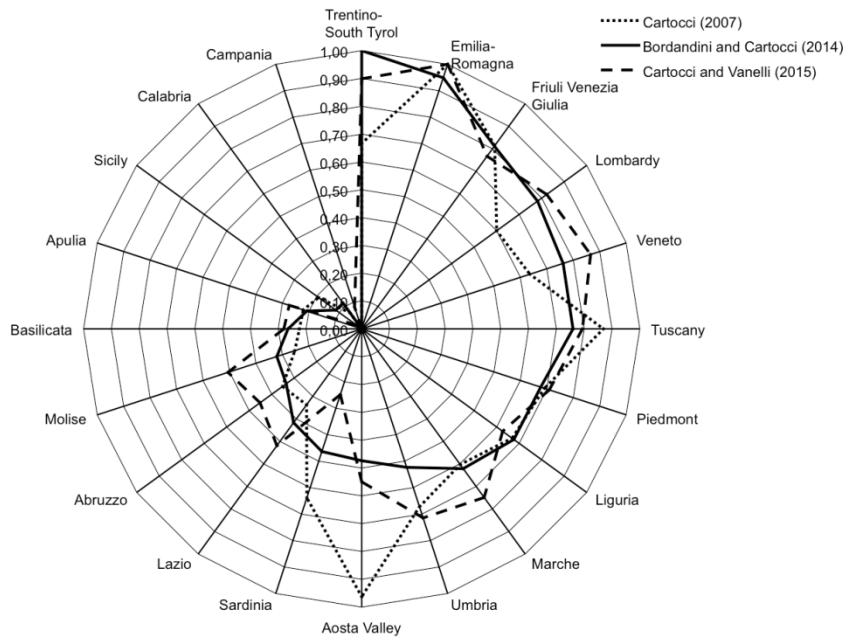
From the three different ‘classifications’ it clearly emerges that some regions consistently rank at the bottom of the list, as in the cases of Calabria, Campania and Sicily. This confirms – as underlined by other studies – that

<sup>10</sup> To calculate the normalized values, the following equation was applied:  $(DP_{2j} - \min DP_2) / (\max DP_2 - \min DP_2)$ , where DP<sub>2j</sub> is the value of the synthetic indicator in region j, whereas minDP<sub>2</sub> and maxDP<sub>2</sub> are, respectively, the min and max value of the DP<sub>2</sub> vector.



these regions suffer from a serious lack of social capital, compared with the other regions, or perhaps, more appropriately, that they lack the forms of social capital that generates *civiness* or well-being within the community. They could, nonetheless, be well endowed with other forms of capital – as suggested by Banfield (1958) – which was not possible to explore in this research.

FIGURE 1. *Values of standardised synthetic indicator of social capital*



By contrast, the Emilia-Romagna region is always towards the top of the ranking; it is ranked second only in the synthetic indicator generated by Bordandini and Cartocci (2014). In the synthetic social capital indicator calculated using the variable by Cartocci (2007), another region with a high level of social capital is the Aosta Valley. In more recent publications, however, this region was found to be characterised by lower levels of social capital endowment, ranking in the middle of the list. Trentino-Alto Adige/Südtirol, on the contrary, is ranked at the middle of the list as far as the Cartocci (2007) synthetic indicator is concerned, while, in the more recent publications, it is ranked first or second. This indicates that the position of this region in the ranking has increased over the years as far as *civiness* is concerned. An analogous trend could also be identified for the Lombardy and

Veneto regions. For the other regions, an equivalent line of reasoning can equally be adopted, and the Kiviat graph presented in figure 1 can help in the interpretation.

These three different synthetic indicators of social capital confirm what Putnam (1993) and other scholars after him (such as Carradore 2009a; Sabatini 2008, Righi, 2013) have described about the distribution of this social resource in Italy: that *civiness* as a behaviour is more widespread in northern Italy than in southern regions. This was also true at the beginning of the financial crisis.

To compare the distribution of ranks for the proposed indexes, the Spearman correlation coefficient was adopted (Table 7) and the coefficients show the indexes to be reliable. Specifically there is a very strong correlation between the rankings generated by Bordandini and Cartocci (2014) and Cartocci and Vanelli (2015) and an acceptable correlation between these and that produced by Cartocci (2007).

TABLE 7. Comparison of three different rankings (Spearman coefficient)

Synthetic Indicator	Cartocci (2007)	Bordandini and Cartocci (2014)	Cartocci and Vanelli (2015)
DP <sub>2</sub> Cartocci (2007)	1	0.78	0.77
DP <sub>2</sub> Bordandini and Cartocci (2014)		1	0.93
DP <sub>2</sub> Cartocci and Vanelli (2015)			1

Table 8 shows a comparison between the original classifications of social capital distribution – calculated as the average of the simple indicators – and the ranks created using the synthetic indicator method for each research publication herein considered. The method used to create the rank is specified in the second row. All the values have been normalised and divided into quartiles. They have also been highlighted through the use of different shades of grey. Since the original ranks of Bordandini and Cartocci (2014) and Cartocci and Vanelli (2015) are the same, these classifications are reported in table 8 only once.

Focusing on the results referring to Cartocci (2007), as far as the cases placed below the second quartile (cases  $\leq 0.5$ ) are concerned, the only noticeable variation is the Molise region. In the ‘original’ classification, Molise was in the second quartile, while the synthetic indicator ‘placed’ it in the first quartile. By contrast, when considering the third and fourth quartiles, the difference between the two methods concerns two autonomous regions: Trentino-Alto Adige/Südtirol and the Aosta Valley. The first is collocated in the third quartile according to the synthetic indicator (whereas in the classification used by Cartocci (2007) it was in the fourth quartile); the second,

instead, has moved from the third to the fourth quartile. The other regions show the same quartile placements.

Comparing the rank created using the average method with that obtained with the synthetic indicator technique derived from the simple indicator adopted by Bordandini and Cartocci (2014), it should be emphasized that Liguria and Sardinia descended one quartile. On the other hand, some regions such as Basilicata, Molise, Lombardy, Tuscany and Veneto moved up a quartile with the DP<sub>2</sub> method. All displacements consisted of one quartile only.

TABLE 8. Comparison between the original classifications and the synthetic indicator rank (normalised values)

Cartocci (2007)				Bordandini and Cartocci (2014) and Cartocci and Vanelli (2015)		Bordandini and Cartocci (2014)		Cartocci and Vanelli (2015)	
Regions	Average	Regions	DP <sub>2</sub>	Regions	Average	Regions	DP <sub>2</sub>	Regions	DP <sub>2</sub>
Emilia-R.	1.000	Emilia-R.	1.000	Trentino-A.	1.000	Trentino-A.	1.000	Emilia-R.	1.000
Tuscany	0.845	Aosta V.	0.963	Emilia-R.	0.836	Emilia-R.	0.949	Trentino-A.	0.899
Friuli-V.G.	0.836	Tuscany	0.869	Friuli-V.G.	0.804	Friuli-V.G.	0.812	Veneto	0.865
Trentino-A.	0.764	Friuli-V.G.	0.814	Liguria	0.756	Lombardy	0.781	Lombardy	0.822
Aosta V.	0.745	Piedmont	0.691	Tuscany	0.682	Veneto	0.762	Tuscany	0.794
Lombardy	0.718	Umbria	0.672	Lombardy	0.678	Tuscany	0.760	Friuli-V.G.	0.767
Piedmont	0.700	Liguria	0.668	Veneto	0.655	Piedmont	0.677	Marche	0.749
Umbria	0.682	Trentino-A.	0.667	Piedmont	0.567	Liguria	0.676	Umbria	0.714
Veneto	0.655	Sardinia	0.638	Sardinia	0.561	Marche	0.621	Piedmont	0.709
Liguria	0.600	Veneto	0.636	Marche	0.520	Umbria	0.523	Liguria	0.626
Sardinia	0.600	Marche	0.603	Aosta V.	0.497	Aosta V.	0.474	Aosta V.	0.550
Marche	0.591	Lombardy	0.600	Umbria	0.428	Sardinia	0.463	Lazio	0.519
Lazio	0.418	Abruzzi	0.352	Lazio	0.415	Lazio	0.417	Molise	0.506
Abruzzi	0.382	Lazio	0.337	Abruzzi	0.311	Abruzzi	0.335	Abruzzi	0.452
Molise	0.264	Molise	0.253	Molise	0.237	Molise	0.321	Basilicata	0.280
Apulia	0.218	Basilicata	0.224	Basilicata	0.215	Basilicata	0.265	Apulia	0.274
Basilicata	0.191	Apulia	0.221	Apulia	0.167	Apulia	0.208	Sardinia	0.248
Sicily	0.145	Sicily	0.192	Sicily	0.165	Sicily	0.115	Campania	0.083
Calabria	0.009	Calabria	0.071	Calabria	0.142	Calabria	0.115	Sicily	0.023
Campania	0.000	Campania	0.000	Campania	0.000	Campania	0.000	Calabria	0.000

In relation to the ranking adopted by Cartocci and Vanelli (2015) it should be pointed out that, when compared to the average rating method, the Aosta Valley, Apulia, Basilicata, Lazio, Molise and Umbria are clustered in higher quartiles. The same is also true for Lombardy, Tuscany and Veneto. Conversely, Liguria and Sardinia are grouped in lower quartiles. The case of Sardinia is remarkable, which, from the third quartile, moved to the first quartile.

Because of the application of the two methods, a deeper methodological analysis, to be developed in a specific study, would be needed in order to describe the variations that occurred in more detail. Although the focus of the present analysis was to illustrate the differences between the various methods, it is also essential that the indicators adopted be considered. In fact, as demonstrated by the synthetic social capital indicators used in Bordandini and Cartocci (2014) and Cartocci and Vanelli (2015), the application of the decomposed electoral participation simple indicator<sup>11</sup> has slightly modified the output. In fact, the simple indicators could have a different discriminatory power in terms of region disparities. Their relevance is discussed in detail in the following section.

#### ***4.1 The effects of the simple indicators on the synthetic social capital indicator***

A further advantage of the synthetic indicator method is that it also allows us to identify the impact exerted by each simple indicator on the synthetic social capital indicator. Tables 9 to 11 report the correction factors and the absolute correlation coefficients of each 'dimension' considered, which also belonged to the research consulted for the present analysis.

Table 9 refers to the study carried out by Cartocci (2007). From the column showing the correction factors, we can notice that the simple indicator making the most significant contribution to the social capital synthetic indicator is 'Blood donation'. The variables 'Member of CONI' and 'Sport associations' respectively contribute 68% and 63% of their information to the social capital indicator. These variables also have a high level of absolute correlation with the synthetic indicator. 'Political participation', although having a level of absolute correlation of 0.76, contributes only 40% of its information to the synthetic indicator of social capital.

The variables exerting the least 'influence' on social capital indicator are 'Members of sport associations' and 'Sport organisations associated to CONI', even though their absolute correlation level is more than 0.5.

Table 10 shows the position of the simple indicators used in the studies carried out by Bordandini and Cartocci (2014) and determining social capital disparities among the Italian regions. At the top of the list is the number of 'Volunteers in non profit organisations', while at the bottom the political participation ('Average political participation') is indicated. In this case, blood

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<sup>11</sup> For the synthetic social capital indicator referred to Bordandini and Cartocci (2014) the mean value of the electoral participation (2008-2013) was used, while the synthetic social capital indicator found in Cartocci and Vanelli (2015) adopted the three different simple indicators used to calculate the mean value of the electoral participation for the 2008-2013 period.

donation, which is ranked second according to the absolute correlation level, contributes 57% of its information, while the contribution percentage ascribed to newspaper diffusion is 44%.

TABLE 9. Correction factors and absolute correlation coefficients of the simple indicators used in Cartocci (2007)

(1-R <sup>2</sup> )	Indicators	r
1	Blood donations	0.914
0.679	Member of CONI	0.783
0.629	Sport associations	0.732
0.459	Newspaper diffusion	0.749
0.395	Political participation	0.762
0.161	Member of sports associations	0.619
0.135	Sport organisation associate to CONI	0.540

TABLE 10. Correction factors and absolute correlation coefficients of the simple indicators used in Bordandini and Cartocci (2014)

(1-R <sup>2</sup> )	Indicators	r
1	Volunteers in non profit organisations (2011)	0.949
0.578	Blood donations (2008)	0.836
0.440	Newspaper diffusion (2009-10)	0.771
0.360	Average political participation (2008-13)	0.684

TABLE 11. Correction factors and absolute correlation coefficients of the simple indicators used in Cartocci and Vanelli (2015)

(1-R <sup>2</sup> )	Indicators	r
1	Electoral participation in the 2013 national election	0.958
0.465	Volunteers in non profit organisation (2011)	0.848
0.421	Blood donation (2008)	0.829
0.375	Electoral participation in the 2009 European election	0.652
0.256	Newspaper diffusion (2009-10)	0.570
0.121	Electoral participation in the 2008 national election	0.918

Considering the simple indicators used in Cartocci and Vanelli (2015), 'Electoral participation in the 2013 national election' is the variable showing the highest correction value. The variable that has the lowest level is 'Electoral participation in the 2008 national election', which contributes 12% of its information to the synthetic indicator. However, this variable has the second highest level of absolute correlation.

Table 12 shows the value of the Relative Individual Coefficient for each study considered here. We preferred to show the RIIC than the DC, because the former includes different dimensions. The first column indicates the research to which the simple indicators, expressed in the second column, belong. The  $\alpha$  column indicates the value of the variable having the highest

level of discrimination power on the synthetic indicator of social capital, while the last column ranks the indicator according to the  $\alpha$  values.

Considering the research carried out by Cartocci (2007), the most relevant simple indicators determining social capital, which have approximately the same level of  $\alpha$ , are threefold, namely: ‘Blood donation’, ‘Members of CONI’ and ‘Sport associations’. The partial indicators with an irrelevant level of influence on social capital indicator are: ‘Sport organisations associated to CONI’ and ‘Political participation’.

*TABLE 12. Simple indicators ranked in terms of the Relative Individual Coefficient*

Study	Indicators	$\alpha$	Rank
Cartocci (2007)	Blood donations	0.243	1
	Member of CONI	0.221	2
	Sport associations	0.210	3
	Newspaper diffusion	0.187	4
	Member of sport associations	0.062	5
	Sport organisation associated to CONI	0.039	6
	Electoral participation	0.038	7
Bordandini and Cartocci (2014)	Volunteers in non profit organisation	0.516	1
	Newspaper diffusion	0.278	2
	Blood donations	0.166	3
	Political participation	0.041	4
Cartocci and Vanelli (2015)	Volunteers in non-profit organisation	0.337	1
	Newspaper diffusion	0.227	2
	Blood donation	0.170	3
	Electoral participation in the 2013 national election	0.150	4
	Electoral participation in the 2009 European election	0.103	5
	Electoral participation in the 2008 national election	0.013	6

In Bordandini and Cartocci (2014) the only simple indicator with high discrimination power is ‘Volunteers in non profit organisations’. On the other hand, ‘Political participation’ is the variable with the least influence on the synthetic indicator.

‘Volunteers in non profit organisations’ and ‘Newspaper diffusion’ are instead the variables which greatly affect social capital in Cartocci and Vanelli (2015). By contrast, as already found in previous studies, ‘Electoral participation in the 2008 national election’, is the simple indicator with the smallest influence on social capital.

As shown in table 12, in all the three studies examined, ‘Political participation’ is the variable that influences the synthetic indicator of social

capital the least when considered in relation to the linear correlation, the correction factors and the discriminatory power of the indicators.

When considering the variables which more significantly affect social capital, a difference between the three studies can be highlighted. However, in the two most recent studies the same variable ranking is noticeable, with voluntary activity at the top of the list, followed by newspaper diffusion, blood donation and, finally, political 'involvement' placed at the bottom of the list.

## 5. Conclusions

The aim of the present study was to analyse social capital using the synthetic indicator method, a technique only rarely applied to this kind of research. More specifically, the synthetic indicator method was used to re-analyse the data employed in previous studies carried out following the approach used by Putnam (1993) in the analysis of social capital.

This method was adopted because it has some positive aspects such as the possibility of creating a ranking of the distribution of social capital at the regional level and of computing the effects that each single variable exerts on the synthetic indicator of social capital.

The outputs of the synthetic indicator method confirm previous research highlighting the existence of a distinction between the northern parts of Italy and the South. In the North, the social capital – indicated as *civiness* – is more widespread than in the South.

Three southern Italian regions – namely Calabria, Campania and Sicily – consistently result at the bottom of the classifications, indicating that they suffer from a serious lack of *civiness*, compared with other regions. Emilia Romagna is the region with the consistently best performance; Trentino-Alto Adige/Südtirol has also a high level of *civiness*, but only when considering the most recent data, because according to the data collected before the onset of the 2008 financial crisis, this region was ranked in the middle of the classification. Lombardy and Veneto have also seen an increase in their levels of *civiness* compared with the other cases.

A comparison of the two methods – i.e., 'averages' vs. 'synthetic indicator' – illustrates some differences in the ranking. However, further studies are needed to clarify these methodological disparities. It could also be interesting to compute a synthetic indicator using another 'approach', such as the Mazziotta-Pareto technique, as used by Ivaldi, Bonatti, Soliani (2017) and Landi, Ivaldi, Testi (2017).

The simple indicators exerting the most significant impact on *civiness* are the variables which describe voluntary activities, including sport associations and blood donation. Such variables refer to relationships with people who are not always known.

Although very carefully designed, the present research shows some limitations. First, it was not possible to create a synthetic indicator of social capital with the data used by Putnam. In fact, his 1993 research titled *Making Democracy Work* does not offer the data for each single variable and region.

A second limitation concerns the indicator number and 'quality'. In the research tradition established by Putnam (1993), the multidimensionality of the social capital concept is analysed using a limited number of variables, or more appropriately, considering only four dimensions – blood donations, political participation, newspaper diffusion and volunteering. In addition, these four dimensions take into consideration only a few 'sides' of multidimensionality while neglecting others such as, for example, involvement in social networks and relationships with work colleagues, which could otherwise affect social capital.

Finally, a third limitation concerns the 'quality' of the indicators. Once again, it is possible to confirm what previous studies have already shown, since some simple indicators – such as blood donation – are 'indirect' or 'outcome' indicators of social capital (Sabatini, 2008; 2009b). Moreover, it is unclear how some indicators – as in the case, for example, of newspaper diffusion – can express the 'social' dimension of the social capital concept (Tronca, 2008).

In spite of these disadvantages, the synthetic indicator method seems to be a powerful 'instrument' to apply in the study of social capital because it offers the opportunity to understand which variables have the most significant impact on the final index. A more in depth analysis of the simple indicators to be used will be necessary in order to grasp the precise meaning of the concept. Moreover, it will be useful to understand that the synthetic indicator technique allows us to use more indicators and may help us to examine a greater number of appropriate indicators. This method could also shed some light on the variables which exert a negative impact on social capital, without the necessity of focusing only on the positive ones, as in the case of the present study. Finally, other statistical methods should be devised in order to assess which parameters affect social capital – defined as *civiness* – and create disparity between the north and the south of Italy.



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